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T E C H N I C A L M A N U A L



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TM 9-1750F**RESTRICTED**

**TECHNICAL MANUAL }
No. 9-1750F }**

**WAR DEPARTMENT
Washington, April 6, 1943**

ORDNANCE MAINTENANCE

POWER UNIT FOR MEDIUM TANKS M3A4 AND M4A4

Prepared under the direction of the

Chief of Ordnance

(with the cooperation of the Chrysler Corporation)

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CHAPTER 1**INTRODUCTION**

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1. SCOPE.

a. This manual is published for the information and guidance of ordnance maintenance personnel. It contains detailed instructions for inspection, disassembly, assembly, maintenance, and repair of the power unit for Medium Tanks M3A4 and M4A4, supplementary to those in the field and technical manuals prepared for the using arms. Additional descriptive matter and illustrations are included to aid in providing a complete working knowledge of the materiel.

2. NATURE OF MATERIEL.

a. The power unit consists of 5 L-head, water-cooled engines mounted radially on a common crankcase. These power units are used in the Medium Tanks M3A4 and M4A4.

3. CHARACTERISTICS.

a. Power units are numbered serially. All power units used in the Medium Tank M3A4 and in medium tanks with serial numbers M4A4-1001 to M4A4-2304 inclusive, incorporate multiple water pumps, one mounted on each engine (figs. 1 and 2). Power units of the Medium Tank M4A4 with serial numbers following M4A4-2304 incorporate a single water pump (mounted on the distributor end of the crankcase (fig. 3). On power units equipped with multiple water pumps, the generator is mounted on No. 2 engine and driven by the No. 2 engine water pump belt (fig. 1). The fuel pump is mounted on the distributor end of the crankcase and driven by the accessory shaft (fig. 1). On power units equipped with the single water pump, the generator is mounted in the fighting compartment and belt driven from the propeller shaft. The fuel pump is mounted on the distributor end of No. 4 engine and driven by the camshaft (fig. 3). Power units of Medium Tank M4A4 with serial numbers M4A4-1001 to M4A4-3211 inclusive, are equipped

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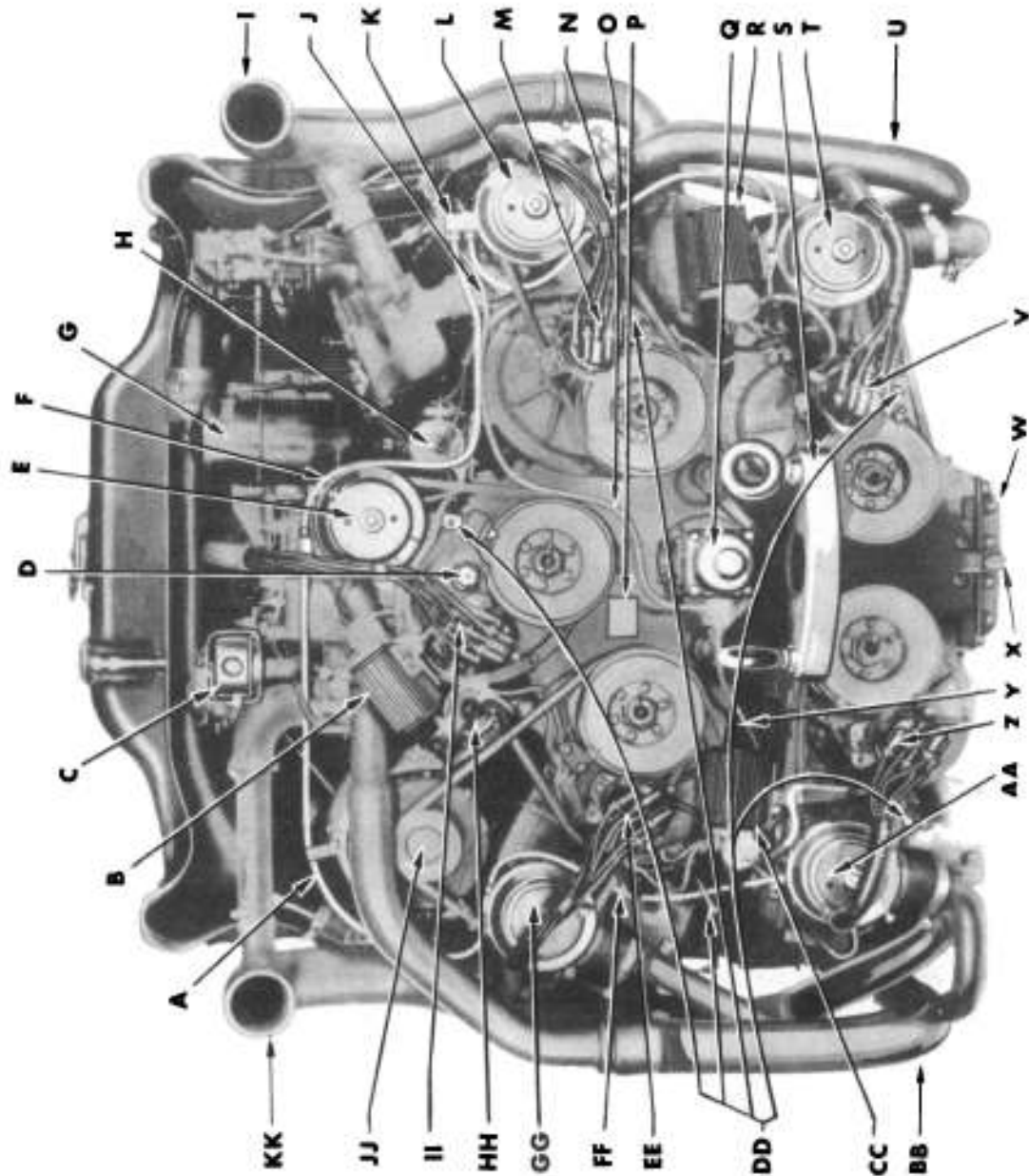


Figure 1 — M3A4 Power Unit, Distributor End

INTRODUCTION

A —TUBE, WATER PUMP AIR RELIEF (ENGINE NO. 1 TO NO. 2)	T —PUMP, WATER, ASSEMBLY (NO. 4 ENGINE)
B —COIL, IGNITION, ASSEMBLY (NO. 1 ENGINE)	U —TUBE, RADIATOR OUTLET, ASSEMBLY (NOS. 4 AND 5 ENGINES)
C —CLEANER, AIR, CRANKCASE VENTILATOR, ASSEMBLY	V —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 4 ENGINE)
D —SHAFT, DRIVE, TACHOMETER	W —PAN, OIL
E —PUMP, WATER, ASSEMBLY (NO. 1 TO NO. 5 ENGINE)	X —PLUG, DRAIN, OIL PAN
F —TUBE, WATER PUMP AIR RELIEF (NO. 1 ENGINE)	Y —TUBE, FUEL PUMP TO BRANCH CONNECTION, ASSEMBLY (FOR NOS. 2 AND 3 CARBURETORS)
G —FILTER, OIL (ABSORPTION TYPE)	Z —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 3 ENGINE)
H —COIL, IGNITION (NO. 5 ENGINE)	AA —PUMP, WATER, ASSEMBLY (NO. 3 ENGINE)
I —PIPE, EXHAUST (NOS. 4 AND 5 ENGINES)	BB —TUBE, RADIATOR OUTLET, ASSEMBLY (NOS. 2 AND 3 ENGINES)
J —TUBE, FUEL PUMP TO BRANCH CONNECTION, ASSEMBLY (FOR NOS. 4 AND 5 CARBURETORS)	CC —COIL, IGNITION, ASSEMBLY (NO. 3 ENGINE)
K —CONNECTION, WATER PUMP AIR RELIEF TUBE	DD —COCK, DRAIN, CYLINDER WATER JACKET, ASSEMBLY
L —PUMP, WATER, ASSEMBLY (NO. 5 ENGINE)	EE —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 2 ENGINE)
M —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 5 ENGINE)	FF —TUBE, WATER PUMP AIR RELIEF (NO. 2 TO NO. 3 ENGINE)
N —TUBE, WATER PUMP AIR RELIEF (NO. 4 TO NO. 5 ENGINE)	GG —PUMP, WATER, ASSEMBLY (NO. 2 ENGINE)
O —TUBE, FUEL PUMP TO NO. 1 CARBURETOR, ASSEMBLY	HH —COIL, IGNITION, ASSEMBLY (NO. 2 ENGINE)
P —PLATE, SERIAL NUMBER, ENGINE	II —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 1 ENGINE)
Q —PUMP, FUEL, ASSEMBLY	JJ —GENERATOR, ASSEMBLY
R —COIL, IGNITION, ASSEMBLY (NO. 4 ENGINE)	KK —PIPE, EXHAUST (NOS. 1, 2 AND 3 ENGINES)
S —SUPPORT, ENGINE, REAR	

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Legend For Figure 1 — M3A4 Power Unit, Distributor End

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ORDNANCE MAINTENANCE — POWER UNIT FOR MEDIUM TANKS M3A4 AND M4A4

with thermostats in the cooling system, mounted in the engine water outlet adapter of each engine. A bypass type of thermostat, mounted in the radiator inlet adapters of engines Nos. 2, 3, 4, and 5 and in the cylinder head adapter of No. 1 engine entered production on power units starting with serial numbers M4A4-3211 of Medium Tank M4A4 (fig. 195). The clutch, of the fully enclosed type, was used in production of the power unit of the Medium Tank M4A4 with serial numbers from M4A4-1001 to M4A4-4412 inclusive (fig. 6). Beginning with the power unit for the Medium Tank M4A4 above serial numbers M4A4-4413, a clutch of the ventilated type entered production.

4. ORGANIZATION MAINTENANCE.

a. Scope. The scope of maintenance and repair by the crew and other units of the using arms is determined by the availability of suitable tools, availability of necessary parts, capabilities of the mechanics, time available, and the tactical situation. All of these are variable and no exact system of procedure can be prescribed.

b. Allocation Of Maintenance. Indicated below are the maintenance duties for which tools and parts have been provided for the using arm personnel. Other replacements and repairs are the responsibility of ordnance maintenance personnel but may be performed by using arm personnel when circumstances permit, within the discretion of the commander concerned. Echelons and words as used in this list of maintenance allocations are defined as follows:

SECOND ECHELON: Line organization regiments, battalions, companies, detachments, and separate companies.

THIRD ECHELON: Ordnance light maintenance companies, ordnance medium maintenance companies, ordnance divisional maintenance battalions, and post ordnance shops.

FOURTH ECHELON: Ordnance heavy maintenance companies, and service command shops.

FIFTH ECHELON: Ordnance base regiments, ordnance bases, arsenals, and manufacturers' plants.

<p>SERVICE (including preventive maintenance): Refer to AR 850-15, paragraph 23 a (1) and (2).</p>	<p>Consists of servicing, cleaning, lubricating, tightening bolts and nuts, and making external adjustments of subassemblies or assemblies and controls.</p>
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INTRODUCTION

REPLACE: Refer to AR 850-15, paragraph 23 a (4). Consists of removing the part, subassembly or assembly from the vehicles and replacing it with a new or reconditioned or rebuilt part, subassembly or assembly, whichever the case may be.

REPAIR: Refer to AR 850-15, paragraph 23 a (3) and (5), in part. Consists of making repairs to, or replacement of the part, subassembly or assembly that can be accomplished without completely disassembling the subassembly or assemblies, and does not require heavy welding, or riveting, machining, fitting and/or alining or balancing.

REBUILD: Refer to AR 850-15, paragraph 23 a (5), in part, and (6). Consists of completely reconditioning and replacing in serviceable condition any unserviceable part, subassembly or assembly of the vehicle, including welding, riveting, machining, fitting, alining, balancing, assembling and testing.

NOTE: Operations allocated will normally be performed in the echelon indicated by "X." Operations allocated to the echelons as indicated by "E" may be accomplished by the respective echelons in emergencies only.

	ECHELONS			
	2nd	3rd	4th	5th
BOXES AND RACKS, AMMUNITION				
Boxes, ammunition — replace	X			
Boxes, ammunition — repair		X		
Racks, ammunition — replace	X			
Racks, ammunition — repair		X		
CONTROLS, BRACKETS AND LEVERS				
Brackets and levers — replace	X			
Brackets and levers — repair		X		
Controls and linkage — replace	X			
Controls and linkage — repair		X		
DRIVE, FINAL (GEAR TRAIN ASSEMBLY) (1-PIECE)				
*Drive, final, gear train assembly — replace		X		
Drive, final, gear train assembly — repair		X		
Drive, final, gear train assembly — rebuild			E	X
DIFFERENTIAL, CONTROLLED, CARRIER ASSEMBLY AND SUBASSEMBLY				
Differential, controlled, assembly — replace		X		
Differential, controlled, assembly — repair		E	X	

*The second echelon is authorized to remove and reinstall power units, transmission assemblies, final drive, gear train assemblies and other items marked by asterisk. However, when it is necessary to replace an item marked by an asterisk with a new or rebuilt part, subassembly or unit assembly, the assembly marked by asterisk will not be removed from the vehicle by the second echelon until authorization is received from a higher echelon.

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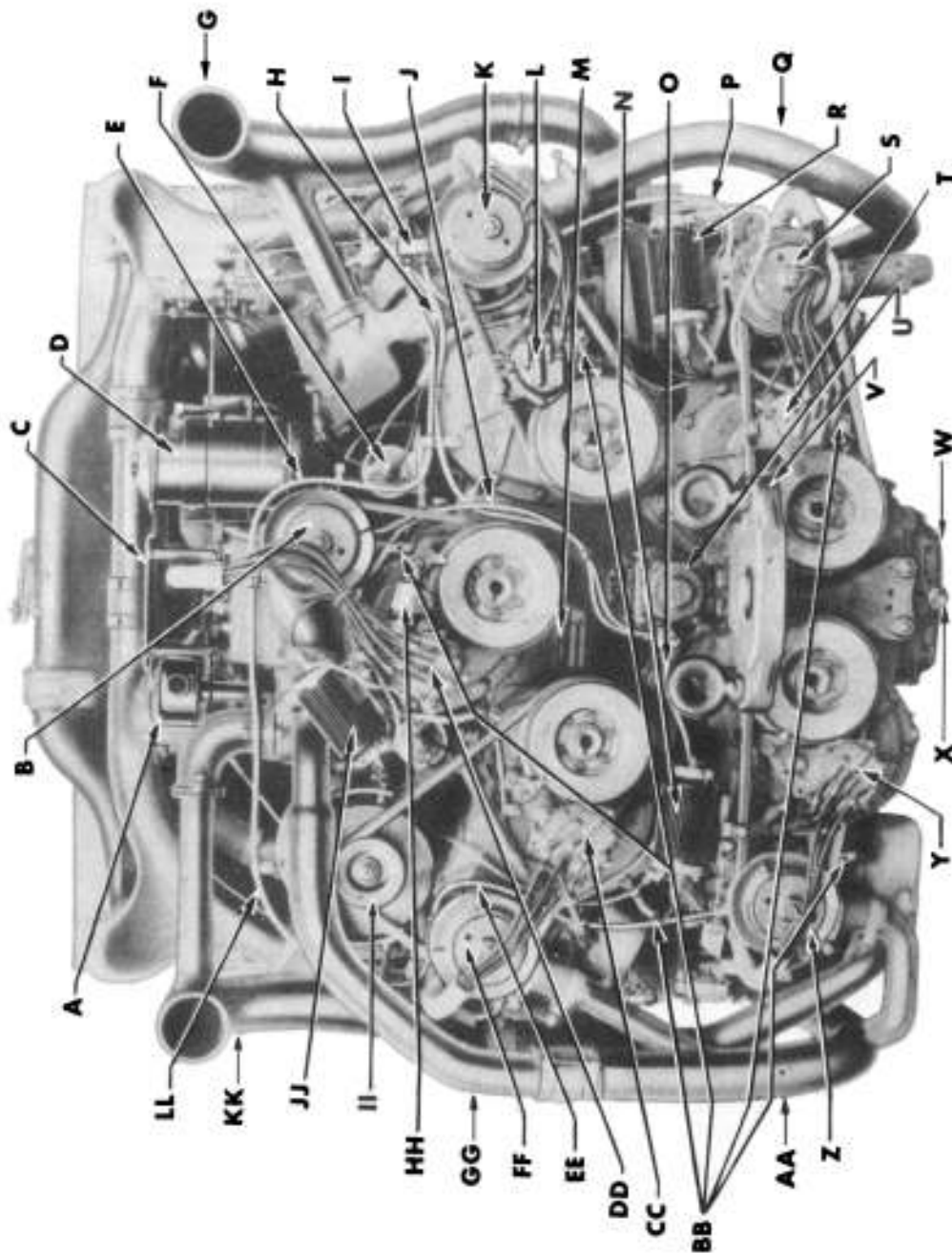


Figure 2 — M4A4 Power Unit, Distributor End (Multiple Water Pump Type)

INTRODUCTION

A —CLEANER, AIR, CRANKCASE VENTILATOR, ASSEMBLY	T —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 4 ENGINE)
B —PUMP, WATER, ASSEMBLY (NO. 1 ENGINE)	U —PUMP, FUEL, ASSEMBLY
C —PLATE, ENGINE LIFTER AND STEP, ASSEMBLY	V —SUPPORT, ENGINE, REAR
D —FILTER, OIL, W/CLAMP, ASSEMBLY	W —PAN, OIL, ASSEMBLY
E —TUBE, WATER PUMP AIR RELIEF (NO. 1 TO NO. 5 ENGINE)	X —PLUG, DRAIN, OIL PAN
F —COIL, IGNITION, ASSEMBLY (NO. 5 ENGINE)	Y —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 3 ENGINE)
G —PIPE, EXHAUST (NOS. 4 AND 5 ENGINES)	Z —PUMP, WATER, ASSEMBLY (NO. 3 ENGINE)
H —TUBE, FUEL PUMP TO BRANCH CONNECTION, ASSEMBLY (FOR NOS. 4 AND 5 CARBURETORS)	AA —TUBE, RADIATOR OUTLET, ASSEMBLY (NOS. 2 AND 3 ENGINES)
I —CONNECTION, WATER PUMP AIR RELIEF	BB —COCK, DRAIN, CYLINDER WATER JACKET, ASSEMBLY
J —TUBE, FUEL PUMP TO NO. 1 CARBURETOR, ASSEMBLY	CC —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 2 ENGINE)
K —PUMP, WATER, ASSEMBLY (NO. 5 ENGINE)	DD —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 1 ENGINE)
L —DISTRIBUTOR, IGNITION, ASSEMBLY (NO. 5 ENGINE)	EE —TUBE, WATER PUMP AIR RELIEF (NO. 2 TO NO. 3 ENGINE)
M —PLATE, SERIAL NUMBER, ENGINE	FF —PUMP, WATER, ASSEMBLY (NO. 2 ENGINE)
N —COIL, IGNITION, ASSEMBLY (NO. 3 ENGINE)	GG —CONNECTION, RADIATOR OUTLET TUBE, ASSEMBLY (NO. 1 ENGINE)
O —TUBE, FUEL PUMP TO BRANCH CONNECTION, ASSEMBLY (FOR NOS. 2 AND 3 CARBURETORS)	HH —GEAR, REDUCTION, TACHOMETER DRIVE, ASSEMBLY
P —TUBE, WATER PUMP AIR RELIEF (NO. 4 TO NO. 5 ENGINE)	II —GENERATOR, ASSEMBLY
Q —TUBE, RADIATOR OUTLET, ASSEMBLY (NOS. 4 AND 5 ENGINES)	JJ —COIL, IGNITION, ASSEMBLY (NO. 1 ENGINE)
R —COIL, IGNITION, ASSEMBLY (NO. 4 ENGINE)	KK —PIPE, EXHAUST (NOS. 1, 2 AND 3 ENGINES)
S —PUMP, WATER, ASSEMBLY (NO. 4 ENGINE)	LL —TUBE, WATER PUMP AIR RELIEF (NO. 1 TO NO. 2 ENGINE)

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Legend For Figure 2 — M4A4 Power Unit, Distributor End (Multiple Water Pump Type)